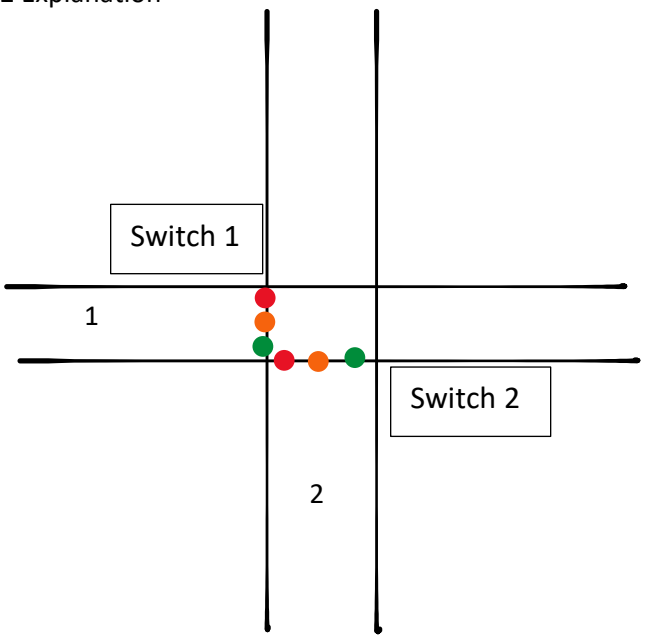
Lecture #5 – OpenGL GLM

Homework #1

Due February 24 @ Midnight

If enough people don't finish, the deadline will be extended

Problem 2 Explanation



Two lanes. Only one lane should be green and the other lane should be red. Two lanes can NOT be green or red at the same time.

Ie) If lane 1 is green, and cars have been waiting in Lane 2, then when you press the switch 2, Lane 1's light should turn orange after a delay then turn red. Then, Lane 2 should switch from red to green.

Submit to Sakai one zipped file of…

Problem 1

OpenGL Program

Problem 2

Microcontroller Code

Video that explains the finished product & How your circuits work

Will be graded by how much effort you put into the homework

Extra Credit – By putting extra effort into the homework

Ie) For problem 1, having a more complex scene like adding a Ferris Wheel

Ie) For problem 2, having a more complex circuitry by adding a switch for emergency service vehicles.

OpenGL GLM

A mathematics library that we can utilize to make things move, place object at certain coordinates, and more.
We'll be utilizing GLM for Transformation & 3D Replication & Camera Movement

void key_callback()
    Used to notify when a physical key is pressed or released or when it repeats

5.1 Transformation

Main Difference is between Lecture 4's Main.cpp and Lecture 5's Main.cpp
    Added lines in Lecture 5's Main.cpp to create Transformation Matrix

glm::mat4 – Creates a 4x4 matrices
- Useful since this will allow us to transform (x,y,z,w) vertices
    - If w == 1, then the vector (x,y,z,1) is a position in space.
    - If w == 0, then the vector (x,y,z,0) is a direction.

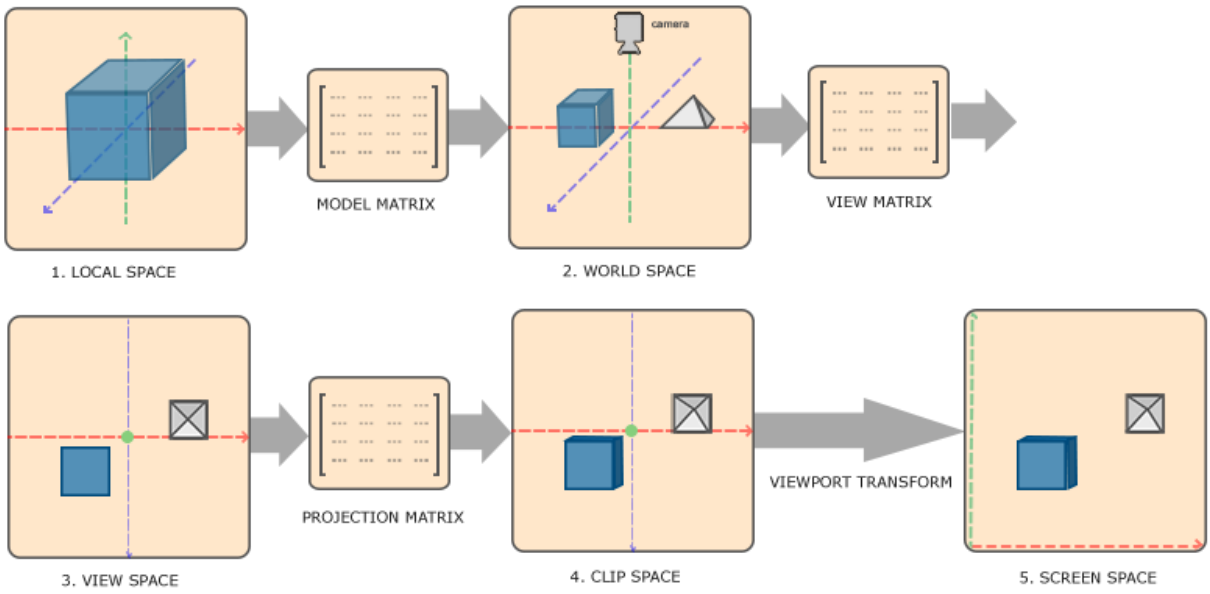
glm::translate – Offsets the object to a different point
    Expects parameters to be the model matrix, vector where you want object to be translated

glm::rotate – Dynamically rotates an object by using time
    Expects parameters to be the model matrix, rotation angle, rotation axis
        Utilize glm::radians to transform angle float into radians

Then we'll transfer the matrices to the vertex shader via
    glGetUniformLocation() & glUniformMatrix4fv()

5.2 Coordinates

Perspective Projection Matrix
    Utilized to transform vertex coordinates from view space to clip space

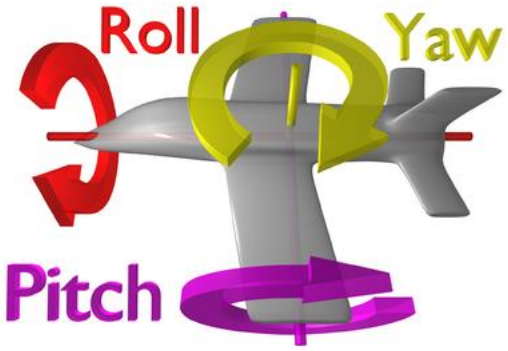


We've also have glEnable(GL_DEPTH_TEST), which allows depth comparison & depth buffer update

We've also created ten extra cubes that rotate around. This can be seen in the for() loop in the while() loop.

5.3 Camera Movements

fov – Perspective field of view
yaw – One of the three aircraft principal axes



void do_movement()
Utilized for camera controls with keyboard

Void scroll_callback()
Utilized to notify when user scrolls, whether with a mouse wheel or touchpad gesture